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A Glossary of Special Terms

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Yearbook on Soil Management ^{1/}

by

(see pg.)
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1/ This glossary includes special terms used in the Yearbook but does not cover all terms used in soil science and related fields. Since competent authorities do not agree precisely on a few definitions, some nearly arbitrary selection has been necessary. An attempt has been made to give the most commonly accepted meaning in soil management. It will be noted that several seemingly common words have special meanings in soil science. Two or more meanings for the same term are given where more than one is in common use or where a general meaning and a specific meaning attached to the same expression. Explanations are given for those words and phrases that can be strictly defined only in highly technical terms.

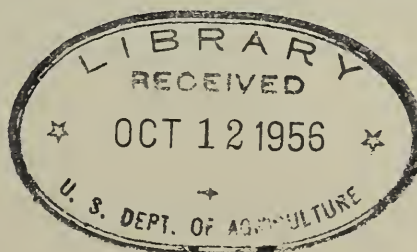
The glossary is based in the first instance on an earlier one prepared by the author and published in the Yearbook of Agriculture for 1938, Soils and Men. In addition to suggestions from numerous soil scientists, the author has drawn on many books and papers, including especially the following:

Soil Survey manual. U. S. Dept. of Agriculture Handbook No. 18, 503 pp. Illus. Washington. 1951.

Soil and water conservation glossary. Jour. of Soil and Water Conservation. 7:41-52; 7:93-104; and 7:144-156. 1952.

Multilingual vocabulary of soil science. Food and Agriculture Organization of the United Nations. 439 pp. Rome. 1954.

Preliminary report of definitions. Committee on Terminology, Soil Science Society of America. 42 pp. (Mimeographed). 1954.



A horizon: The surface horizon of a mineral soil having maximum biological activity, or eluviation (removal of materials dissolved or suspended in water), or both.

ABC soil: A soil with a complete profile, including an A, a B, and a C horizon.

AC soil: A soil with an incomplete profile, including an A and a C, but no B horizon. Commonly such soils are very young, like those developing from alluvium or on steep rocky slopes.

Absorbing complex: The material in the soil that absorbs water and chemical compounds. This material is chiefly the fine mineral matter and fine organic matter.

Acid soil: A soil that is acid throughout most or all of the parts of it occupied by plant roots. Practically, this means a soil more acid than pH 6.6; precisely a soil with a pH value less than 7.0. More technically, a soil having a preponderance of hydrogen over hydroxyl ions in the soil solution.

Aeration, soil: The replacement of air and other gases in soil with air from the atmosphere. In a "well aerated" soil the composition of the air in the soil is similar to that in the atmosphere; whereas in a "poorly" aerated soil the air in the soil has a relatively high amount of carbon dioxide and other gases and a relatively low amount of oxygen.

Aerobic: (1) Conditions with free oxygen as a part of the environment. (2) Living or acting only in the presence of free oxygen. (3) Pertaining to organisms that grow under aerobic conditions, such as aerobic decomposition.

Aggregate (of soil): A single mass or cluster of soil consisting of many soil particles held together, such as a granule, clod, block, or prism.

Agricultural land: Land in farms or ranches regularly used for agricultural production. The term includes all the land devoted to crop or livestock enterprises - the farmstead, lanes, drainage and irrigation ditches, water supply, land in crops, and grazing land of every kind. Generally, farm woodlands used for wood production are included, although some authors exclude them from the term.

Agricultural production: Production from crop or livestock enterprises on farms and ranches.

Agronomy: This term is commonly used in two different senses in the United States: (1) The applied phases of the plant sciences dealing with field crops, and (2) the applied phases of both the plant sciences and soil science dealing with field crops. In the U. S. Department of Agriculture the first definition is used; whereas some of the agricultural colleges use one and some the other.

Alkali soil: Generally, a soil containing highly alkaline salts, such as sodium carbonate. More precisely, an alkali soil has so high a degree of alkalinity - pH 8.5 or higher - , or so high a percentage of exchangeable sodium - 15 percent or higher, or both, that the growth of most crop plants is reduced. (In former years this term was also applied loosely to both alkali and saline soils).

Alkaline soil: A soil that is alkaline throughout most or all of the parts of it occupied by plant roots. Precisely, any soil horizon having a pH value greater than 7.0; but practically a soil having a pH value above 7.3.

Alluvial soils: Kinds of soil developing from transported and relatively recently deposited material (alluvium) with little or no modification of the original materials by soil-forming processes. (Soils with well-developed profiles that have formed from alluvium are grouped with other soils having the same kinds of profiles, not with the Alluvial soils.)

Alluvium: Sand, mud, and other sediments deposited on land by streams.

Alpine Meadow soils: An intrazonal group of dark-colored soils of open or sparsely timbered meadows, usually moist, at high altitudes either near or above the timberline. (Mountain Meadow soils are more wet than Alpine Meadow soils and are more common below the timberline).

Amendment (soil): Any material, such as lime, gypsum, or sawdust, worked into the soil to make it more productive. Strictly a fertilizer is an amendment but the term 'amendment' is most commonly used for added materials other than fertilizer.

Ammonification (soil): The formation by organisms of ammonium compounds, especially from such organic materials as leaves, straw, or manure.

Anion: An ion carrying a negative charge of electricity. (See Ion).

Anthropic soil: A soil with highly significant and relatively permanent characteristics that have been produced from natural soils or other earthy deposits by the work of man. Examples include soils with deep, black surface soils resulting wholly from centuries of manuring, and naturally acid soils that have lost their distinguishing features because of many centuries of liming and of use for grass.

Apparent density: See Bulk density.

Arable land: Land physically capable of producing crops requiring tillage without clearing or other major physical improvements.

Arid climate: A very dry climate like that of desert or semidesert regions where there is only enough water for widely spaced desert plants. The limits of precipitation vary widely according to temperature, with an upper limit for cool regions of less than 10 inches and for tropical regions of as much as 20 inches. (The precipitation-effectiveness (P-E) index ranges from 0 to about 16).

Association, soil: See Soil association.

Ash: The nonvolatile residue resulting from the complete burning of organic matter.

Available nutrient in soils: That part of a plant nutrient in the soil that can be taken up by plants at rates and in amounts significant to plant growth.

Azonal soils: A general group of those kinds of soils having little or no soil profile development. Most of them are very young. In the United States the following main groups are included within the azonal group: Alluvial soils, Lithosols, and Regosols.

B horizon: A soil horizon, usually beneath an A horizon, or surface soil: (1) in which clay, iron, or aluminum, with accessory organic matter, have accumulated by receiving suspended material from the A horizon above it, (2) by clay development in place, (3) an horizon having a blocky or prismatic structure, or (4) with some combination of these features. In soils with distinct profiles, the B horizon is very roughly equivalent to the general term "subsoil."

Badlands: Nearly barren, rough, broken land deeply cut by streams, most common in arid and semiarid regions where intermittent streams have cut into soft rocks. Apparently the term arose from the expression 'bad lands to ride over.'

Base exchange capacity (of soil): A measure of the total amount of exchangeable cations that can be held by the soil. It is expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7). (Commonly called "cation exchange capacity" also.)

Base saturation: The relative degree to which soils have metallic cations absorbed. More precisely, the part of the exchange capacity saturated with metallic cations at pH 7 or higher.

Base map: A map with such points of reference as county, township, or section lines, and roads and other physical and cultural features to allow the accurate plotting of other kinds of data: The base map for a detailed soil map, for example, shows political subdivisions, streams, roads, houses, and other prominent features necessary for plotting the soil boundaries and for reading them off the map.

Basin listing: A method of tillage that creates small basins by damming lister furrows at regular intervals of about 4 to 20 feet. This method is a modification of ordinary listing and is carried out approximately on the contour on nearly level or gentle sloping soils as a means of encouraging water to enter the soil rather than running off the surface.

Basin irrigation: The application of irrigation water to level areas, surrounded by earth banks or terraces. The water stands on uncropped soils for several days until well soaked into the soil; then any excess flows onto the next field. On fields having a crop the water may stand no more than a few hours.

BC soil: A soil with a B and a C horizon but with little or no A horizon. Most BC soils have lost their A horizons by erosion or soil blowing.

Bedding, soil: The elevation of the surface of fields by plowing and grading into a series of beds separated by shallow ditches for drainage.

Bedrock: The solid rock underlying soils and other earthy surface formations.

Bench terraces: An embankment constructed across sloping soils with a steep drop on the down-slope side. (See Terrace).

Blocky structure: (See Structure, soil.

Blowout: An area of soil from which most or all of the fine soil material has been removed by wind. Such an area appears as shallow depressions with flat or irregular floor consisting of a resistant layer, or accumulation of pebbles, or by exposure of the water table. The soil is usually barren. Blowouts are common near dunes.

Bog soil: An intrazonal group of soils with mucky or peaty surface soils underlain by peat. Such soils usually have swamp or marsh vegetation and are most common in humid regions, although a few border the sea, lakes, and streams in arid regions. In regions of nearly continuous rain or mist they are common on steep slopes as well as in depressions.

Border irrigation: Irrigation where the water flows over narrow strips having very gentle slopes and separated by low bordering banks or ridges.

Broad-base terrace: A low embankment, with such gentle slopes that it can be farmed, constructed across sloping soils approximately on the contour. Broad-base terraces are used on gently sloping pervious soils to reduce runoff and erosion. (See Terrace).

Brown Forest soils: An intrazonal group of soils that have dark-brown surface horizons, relatively rich in humus, grading through lighter colored soil into the parent material, and that are characterized by a slightly acid or neutral reaction and a moderately high amount of exchangeable calcium. They are commonly developed under deciduous forests from parent materials relatively rich in bases, especially calcium.

Brown Podzolic soils: A zonal group of soils with thin mats of partly decayed leaves over very thin grayish-brown mixed humus and mineral soil, which lie over yellow or yellowish-brown B horizons, slightly richer in clay than the surface soils. These soils are developed under deciduous or mixed deciduous and coniferous forests in cool temperate humid regions such as parts of New England and New York and of western Washington.

Brown soil: A zonal group of soils having a brown surface horizon that grades below into lighter colored soil. These soils have an accumulation of calcium carbonate at 1 to 3 feet. They are developed under short grasses, bunch grasses, and shrubs in a temperate to cool semiarid climate.

Buffer, buffering (in soils): Substances in the soil that act chemically to resist changes in reaction or pH are called buffers. The buffering action is due mainly to clay and very fine organic matter. Old weathered clays are less active buffers than young clays. Thus with the same degree of acidity, or pH, more lime is required to neutralize a clayey soil than a sandy soil, a soil rich in organic matter than one low in organic matter or a sandy loam in Michigan than a sandy loam in Central Alabama.

Buffer strips: Established strips of grass or other erosion-resisting vegetation, usually on the contour in cultivated fields, to reduce runoff and erosion.

Bulk density: The mass or weight of dry soil per unit volume, including air space, in relation to the weight of water. (Formerly called "apparent density.")

C horizon: The unconsolidated rock material in the lower part of the soil profile like that from which the upper horizons (or at least a part of the B horizon) have been developed.

Calcareous soil: A soil containing calcium carbonate; or a soil alkaline in reaction owing to the presence of free calcium carbonate. More precisely, a soil containing enough calcium carbonate, or calcium carbonate and magnesium carbonate together, to effervesce (fizz) when treated with hydrochloric acid.

Caliche: A broad term for more or less cemented deposits of calcium carbonate in many soils of warm-temperate areas, as in the southwestern part of the United States. When very near the surface or exposed by erosion the material hardens.

Capillary porosity: Within the soil the volume of small pores that hold water against the force of gravity.

Capillary water: The water retained in the fine pores in soil by surface tension against the force of gravity.

Carbon-nitrogen ratio: The ratio of the weight of organic carbon to the weight of total nitrogen in a soil or in an organic material. The number is obtained by dividing the percentage of organic carbon in the soil or material by the percentage of nitrogen.

Catch crop: A crop grown to replace a main crop that has failed; or a crop produced incidental to the principal rotation and usually occupying the soil for only a short period.

Catena: A group of soils within a specific soil zone developed from similar parent materials but with unlike soil characteristics owing to differences in relief or drainage.

Cation: An ion carrying a positive charge of electricity. (See Ion).

Cation exchange: The exchange of cations held by the soil absorbing complex with other cations introduced from the outside. Thus if a soil absorbing complex is rich in sodium, treatment with calcium sulphate (gypsum) causes the calcium cations to exchange with the sodium cations. The expression "cation exchange capacity" is used interchangeably with "base exchange capacity."

Check dam: A small, low dam built in a gully or other water course to detain water and to decrease the velocity of stream flow.

Chernozem soils: A zonal group of soils having deep, dark to nearly black surface horizons, rich in organic matter, which grade into light colored soil below. At 2 1/2 to 4 feet these soils have layers of accumulated calcium carbonate. They are developed under tall and mixed grasses in a temperate to cool subhumid climate. (These soils were first described in Russia and the term is a Russian word meaning black earth.)

Chert: A structureless form of silica, closely related to flint, which breaks into angular fragments. Soils developed from impure limestones containing fragments of chert and having abundant quantities of these fragments in the soil mass are called "cherty" soils.

Chestnut soil: A zonal group of soils with dark-brown surface horizons that grade into lighter colored soil beneath. They have layers of accumulated calcium carbonate at 1 1/2 to 4 feet. They are developed under mixed tall and short grasses in a temperate to cool and subhumid to semiarid climate. Chestnut soils occur in regions a little more moist than those having Brown soils and a little drier than those having Chernozem soils.

Chisel: A tillage machine with one or more soil-penetrating points that can be drawn through the soil to loosen or to shatter the subsoil to a depth of 12 to 18 inches.

Clay: Clay has two meanings in common use: (1) As a soil separate, the mineral soil particles less than 0.002 mm in diameter. (2) As a soil textural class, soil material that contains 40 percent or more of clay, as defined in the previous sentence, and less than 45 percent sand and less than 40 percent silt.

Clay loam: Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Clay mineral: Crystalline material in soils or other earthy deposits of clay size - below 0.002 mm in diameter.

Clayey soil: A soil rich in clay relative to sand.

Claypan: A compact soil horizon rich in clay and separated more or less abruptly from the overlying soil. Claypans are commonly hard when dry and plastic or stiff when wet.

Clod: A mass of soil produced by plowing or digging that slakes with repeated wetting and drying, in contrast to a ped, which is a natural soil aggregate.

Colloid, soil: The term "colloid" refers to either organic or inorganic matter having very small particle size and a correspondingly large surface area per unit of mass. Most individual soil colloids are too small to be seen with the ordinary compound microscope. Although soil colloids do not go into true solution like sugar or salt do, they may be dispersed into a relatively stable suspension and thus be carried in moving water. By treatment with salts and other chemicals, colloids may be flocculated or aggregated into small crumbs or granules that settle out of water. (Such small crumbs of aggregated colloids can be washed away by rapidly moving water just as other particles can be). Many mineral soil colloids are really tiny crystals and the minerals can be identified with the X-ray and in other ways.

Colluvium: Mixed deposits of soil material and rock fragments near the base of rather steep slopes. The deposits have accumulated through soil creeps, slides, and local wash.

Companion crop: A crop grown with another crop, usually a small grain crop with which alfalfa, clover, or other forage crops are sown. (Formerly such small grain crops were known as "nurse crops"; but since the small grain does not "nurse" the other crop this older term is being abandoned).

Complex, soil: An intimate mixture of areas of different kinds of soil that are too small to be shown separately on a publishable soil map. The whole group of soils must be shown together and described as a pattern.

Compost: A mass of rotted organic matter made from waste plant residues, usually supplemented with inorganic fertilizers, especially nitrogen, and a small amount of soil. The organic residues are usually piled up in layers to which the fertilizers are added. These layers are separated by thin layers of soil. The soil is kept moist and allowed to decompose. For best results the pile is usually turned once or twice. The principal purpose in making compost is to permit the organic materials to become crumbly and to reduce the carbon-nitrogen ratio of the material. (Compost is sometimes called "synthetic manure.")

Concretions: Relatively hard grains, pellets, or nodules of local concentrations of compounds in the soil that irreversibly cement the soil grains together. The composition of some concretions is unlike that of the surrounding soil. Concretions can be of various sizes, shapes, and colors.

Consistence, soil: The nature of soil material that is expressed by the resistance of the individual particles to separate from one another (cohesion) or by the ability of a soil mass to undergo a change in shape without breaking (plasticity). The consistence of a soil varies with its moisture content. Thus a soil aggregate or clod may be hard when dry and plastic when wet. Highly productive soils commonly have a friable consistence under optimum field moisture.

Continental climate: A general term for the climate typical of great land masses where there are wide ranges in temperature and other weather conditions not significantly influenced by nearness to the sea. Much of the United States has a continental climate.

Contour: An imaginary line connecting points of equal elevation on the surface of the soil. Thus a "contour" terrace is one laid out on a sloping soil at right angles to the direction of the slope and level throughout its course. In "contour plowing" the plowman keeps to a level line at right angles to the direction of the slope, which usually results in a curving furrow.

Corrugation irrigation: A method for irrigating close-grown crops and orchards through small, closely spaced ditches.

Creep, soil: The downward mass movement of sloping soil at a slow rate. The movement is usually irregular and occurs when the lower soil is nearly saturated with water.

Crop residues: The plant residues left in the field after harvesting, such as stubble, straw, and corn stover.

Cropland: Land regularly used for crops, except forest crops, including rotation pasture, cultivated summer fallow, and temporarily idle land.

Crumb structure: Very porous granular structure in soils.

Crust: (1) A thin brittle layer of hard soil that forms on the surface of many soils when they are dry. (2) An exposed hard layer of materials cemented by calcium carbonate, gypsum, or other binding agents. Most desert crusts are formed by the exposure of such layers through removal of the upper soil by wind or running water and their subsequent hardening.

Crystalline rocks: A general term for igneous and metamorphic rocks that are composed of mineral crystals formed in place.

D layer: Any stratum underlying the soil profile that is unlike the material from which the soil has been formed.

Dealkalization: Removal of alkali from the soil, usually by chemical treatment and leaching.

Deep soil: Generally, a soil deeper than 40 inches to rock or other strongly contrasting material. This term, however, is used in different senses by different authors, for: (1) A soil with a deep black surface layer; (2) a soil deeper than about 40 inches to the parent material or to other unconsolidated rock material not modified by soil-forming processes; or (3) a soil in which the total depth of unconsolidated material, whether true soil or not, is about 40 inches or more.

Deferred grazing: The postponement of grazing in order to improve the growth and vigor of the forage.

Deflocculate: To separate or to break up soil aggregates of clay into the individual particles; to disperse the particles of a granulated clay to form a clay that "runs-together" or puddles.

Degradation (of soils): The change of one kind of soil to a more highly leached kind, such as the change of a Chernozem to a Podzol.

Demonstration farm: A farm on which improved practices are fitted together into a combination for optimum sustained production by the operator with technical and other assistance, and which is intended as a guide to other farmers having similar soils

Denitrification: The reduction of the nitrates in the soil or organic deposits to nitrites, ammonia, and elemental nitrogen by soil organisms, especially those organisms that can grow with very low amounts of oxygen.

Desalinization: Removal of salts from saline soil, usually by leaching.

Desert soil: A zonal group of soils having light colored surface soils that are usually underlain by calcareous material and frequently by hard layers. They are developed under extremely scanty scrub vegetation in warm to cool arid climates.

Desilting area: An area of vegetation used for removing the sediment from flowing water.

Detailed soil map: A soil map for which the soil boundaries have been plotted on a base map, or aerial photograph, from observations made throughout their course and for which the kinds of soil are classified and the boundaries shown in all the detail significant to soil use and management.

Dispersion of soil: Deflocculation of the soil and its suspension in water.

Diversion: A channel with a supporting ridge on the lower side constructed across the slope of a soil to intercept runoff water, in order to minimize soil erosion and to prevent excess moisture accumulating in the soil of the lower slopes.

Drainage (as a practice). The removal of excess surface water or excess water from within the soil by means of surface or subsurface drains.

Drainage, soil: (1) The rapidity and extent of the removal of water from the soil, in relation to additions, by surface runoff, by flow through the soil to underground spaces, or by a combination of both processes. (2) As a condition of the soil, soil drainage refers to the frequency and duration of periods when the soil is free of saturation. For example, in well-drained soils, the water is removed readily, but not rapidly; in poorly drained soils, the root zone is waterlogged for long periods and the roots of ordinary crop plants cannot get enough oxygen; and in excessively drained soils the water is removed so rapidly that most crop plants suffer from lack of water.

Drift: Material of any sort deposited by geological processes in one place after having been removed from another. Glacial drift includes the materials deposited by glaciers and by the streams and lakes associated with them.

Drop-inlet dam: A dam through which overflow water is carried through a shallow, sloping pipe in order to drop water from one level to another for gradient control and for stabilization of a waterway.

Dry farming: Generally, producing crops requiring at least some tillage in subhumid to semiarid regions without irrigation. Commonly the system involves periods of fallow between crops during which water from precipitation is adsorbed and retained. The fallow period is usually 1 or 2 years for each year of cropping.

Dry sands: A group of kinds of soil consisting of excessively drained sandy deposits in which there is no clear development of soil characteristics since deposition.

Duckfoot (cultivator) An implement with spreading V-shaped blades for shallow cultivation without turning the surface soil, burying crop residues, or pulverizing surface clods.

Duff: The matted peaty organic surface layer of forested soils.

Dune: Generally, a mound or ridge of loose sand piled up by the wind. Occasionally during periods of extreme drouth, well granulated soil material of heavy texture may also be piled into low dunes, sometimes called "clay dunes."

Dust mulch: A loose, dry surface layer of a cultivated soil, formerly thought to be effective in reducing the loss of moisture from the underlying soil.

Ecology: The branch of biology that deals with the mutual relations among organisms and between organisms and their environment.

Edaphic: A general term sometimes used for soil influences or conditions.

Effluent: The out-flowing of water from a subterranean storage space.

Electrolyte: (1) Any conductor of electric current in which chemical change accompanies the passage of the current and the amount of the change is proportional to the amount of current passed. Usually electrolytes are solutions of substances in a liquid, such as salt in water. (2) By a common extension of meaning an electrolyte is a substance that forms a conductor of electricity when added to a solvent. Thus common table salt becomes an electrolyte when added to water.

Eluvial horizon: (See Eluviation).

Eluviation: The movement of nearly insoluble soil material from one place to another within the soil in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; while those that have received material are illuvial. With an excess of rainfall over evaporation, eluviation may take place either downward or laterally according to the direction of water movement. The term refers especially, although not exclusively, to the movement of soil colloids in suspension; whereas leaching refers to the removal of soluble materials such as salt in true solution.

Erosion, accelerated soil: Erosion of the soil over and above normal erosion, brought about by changes in the natural cover or ground conditions, especially changes caused, directly or indirectly, by human interference.

Erosion, geological: Generally, the total erosion from a geological formation. More specifically it includes normal soil erosion and the erosion of geological materials that are not soil, such as bare mountain slopes and the erosion of the beds and sides of streams and gullies after any soil has been removed.

Erosion, gully: Accelerated erosion by water that produces channels larger than rills. Ordinarily, these erosion-produced channels form where water is concentrated; they carry water only during and immediately after rains or after the rapid melting of snow.

Erosion (land) : The wearing away of the land surface by moving water, wind, or other geological agents.

Erosion, normal soil: The erosion characteristic of the local kinds of soil in their natural undisturbed habitat. That is, the erosion of a sloping upland soil that is just balanced by the rate of new soil formation from the rock materials beneath is the normal erosion for that soil.

Erosion pavement: A layer of pebbles or stones on the surface of the ground remaining after the removal of the fine particles by running water or wind. Such pavements are most conspicuous in arid regions where they are often called desert pavements.

Erosion, rill: Accelerated erosion by water that produces small channels that are or can be obliterated by tillage.

Erosion, sheet: Removal of a more or less uniform layer of soil material by accelerated erosion. In sheet erosion the eroding surface actually consists mainly of numbers of very small rills.

Erosion (soil): (1) Removal of true soil material by running water, including normal soil erosion and accelerated soil erosion. (2) Removal of true soil material by wind or running water, including normal soil erosion and accelerated soil erosion.

Erosion, wind: Erosion caused by the blowing away of loose soil material, usually during dry periods. Equivalent to "soil blowing."

Evapo-transpiration: The loss of water from a soil by evaporation and plant transpiration.

Exchange: As a chemical term, a reaction between two substances that involves an interchange of parts of the substances.

Exchangeable: This word describes the ions in the absorbing complex of the soil that can be exchanged with other ions. For example, by liming acid soils, calcium ions exchange for hydrogen ions in the complex; and by treating alkali soils with gypsum calcium ions exchange for sodium ions that are leached away.

Fallow: Cropland left idle in order to restore productivity through accumulation of water, nutrients, or both. Summer fallow is a common stage before cereal grain in regions of limited rainfall. The soil is tilled for at least one growing season for the control of weeds and to encourage the storage of moisture for a succeeding grain crop. Bush or forest fallow is a rest period between crops under woody vegetation.

Fertilizer: Any natural or manufactured material added to the soil in order to supply one or more plant nutrients. The term is generally applied to largely inorganic materials (mineral fertilizers) sold in the trade.

Fertilizer grade: An expression that indicates the percentage of plant nutrients in a given fertilizer. Thus a 10 - 20 - 10 contains 10 percent nitrogen, 20 percent phosphoric acid (P_2O_5), and 10 percent potash (K_2O). This convention is in common use even though the materials containing nitrogen, phosphorus, and potash are in other forms.

Fertility, soil: That quality of a soil that enables it to provide the proper compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, temperature, and the physical condition of the soil are favorable.

Field capacity: The amount of moisture remaining in a soil after the free water has been allowed to drain away, expressed as a percent of the oven dry weight of soil. It is the highest amount of moisture that the soil will hold under conditions of free drainage after excess water has drained away following a rain that has wet the whole soil. For permeable soils of medium texture this is about 2 or 3 days after the rain. Each kind of soil has its specific value for field capacity.

Film water: The water held on the surfaces of soil particles that does not drain away. Most of it is available to plant roots.

Filter strip: A strip of permanent vegetation above farm ponds, diversion terraces, and other structures to retard runoff and to cause the deposition of any material suspended in the water.

Fine-textured soil: Roughly, clayey soils with 35 percent or more of clay.

First bottom: The normal flood plain of a stream subject to frequent or occasional flooding.

Fixation (in soil): The conversion of a soluble material, such as a plant nutrient like phosphorus, from a soluble or exchangeable form to a nearly insoluble form. (See Nitrogen fixation).

Flocculate: To aggregate individual tiny soil particles, especially fine clay, into small groups or granules. (The opposite of deflocculate or disperse).

Flood plain: The nearly flat land along streams that overflow.

Flush irrigation: Irrigation by running water over nearly level soil in a shallow flood.

Foliar diagnosis: Estimation of the plant-nutrient requirements of a soil through chemical analyses of plant leaves, by their color manifestations, or by both methods together.

Food, plant: The organic compounds elaborated by a plant within its cells. (Sometimes used loosely as an equivalent to plant nutrients).

Forest land: Land not in farms, bearing a stand of trees at any age or stature, including seedlings, and of species attaining a minimum of 6 feet average height at maturity; or land from which such a stand has been removed but on which no other use has been substituted. (Forests on farms are called farm woodland or farm forests.)

Fragipans: Very dense and brittle pans in soils that owe their hardness mainly to extreme density rather than to high clay content or cementation. When removed the material is loose but in place it is so dense that roots cannot penetrate and water moves through it very slowly because of small pore size.

Free; as of silica, ferric oxide, or calcium carbonate. The condition of the substance within a mixture when it is not chemically combined with the other components of the mixture. For example, iron oxide in soils may be by itself as free iron oxide, or it may be combined with other elements in a mineral.

Furrow irrigation: The application of irrigation water through furrows to crops planted in rows.

Genesis, soil: The mode of origin of the soil with special reference to the processes responsible for the development of the solum, or true soil, from the unconsolidated parent material.

Gley soil: A soil horizon in which waterlogging and lack of oxygen has caused the material to be a neutral gray in color. The term is also applied, as in "moderately" gley soil, to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Granular structure: That structure in soils where the individual grains are grouped into spherical aggregates with indistinct sides. Highly porous granules are commonly called crumbs. A "well-granulated" soil has the best structure for most ordinary crop plants.

Gravitational water: The water in the large pores of the soil that drains away under the force of gravity with free underdrainage. Well-drained soils have such water only during and immediately after rains or applications of irrigation water. In poorly drained soils this water accumulates in the pores at the expense of air. Under such conditions the soil lacks oxygen for the roots of most crop plants and is said to be waterlogged.

Gray-Brown Podzolic soils: A zonal group of soils having comparatively thin organic coverings and organic-mineral layers over grayish-brown leached layers that rest upon brown B horizons richer in clay than the soil above. These soils have formed under deciduous forests in a moist temperate climate.

Grazing land: Land regularly used for grazing, except cropland and rotational pasture.

Great soil group: Any one of several broad groups of soil with fundamental characteristics in common. Examples are Chernozem, Gray-Brown Podzolic, and Podzol.

Green-manure crop: Any crop grown and plowed under for the purpose of improving the soil.

Ground water: Water that fills all the pores of underlying material below the water table which is the upper limit of saturation.

Ground-Water Podzol: An intrazonal group of soils, developed from imperfectly drained sandy deposits in humid regions, with thin organic layers over light-gray or white leached layers that rest on dark-brown hard B horizons irregularly cemented with iron, organic matter, or both.

Gully: A channel or miniature valley cut by running water in which water flows only during and immediately after rains or the rapid melting of snow.

Halophytic vegetation: Salt-loving or salt-tolerant vegetation, usually with fleshy leaves or thorns.

Hardpan: An indurated or cemented soil horizon or layer. The soil material may be sandy or clayey and may be cemented by iron oxide, silica, calcium carbonate, or other substances.

Heavy soil: An old term formerly used for clayey or fine-textured soils. (The term originated from the "heavy" draught on the horses when plowing.)

Horizon, soil: A layer of soil, approximately parallel to the soil surface, with characteristics produced by soil-forming processes. The relative positions of the several soil horizons in the soil profile and their nomenclature are shown below:

(Intends to insert Figure 27 of the Soil Survey Manual, page 175).

Humid climate: (1) Generally, a climate with sufficient precipitation to support a forest vegetation, although there are exceptions where the plant cover includes no trees, as in the Arctic, or high mountains for example. The lower limit of precipitation may be as little as 15 inches in cool regions and as much as 60 inches in hot regions. The precipitation-effectiveness (P-E) index ranges between 64 and 128. (2) A climate having a high average relative humidity.

Humus: The well-decomposed, more or less stable part of the organic matter in soils.

Hygroscopic coefficient: The amount of moisture in a dry soil when it is in equilibrium with a saturated atmosphere, expressed in terms of percentage on the basis of oven-dry soil.

Hygroscopic water: Water tightly held on the surfaces of soil particles that can be removed only by strong heat. This water is unavailable to plants. The amount may be as low as 1 pound of water for each 100 pounds of oven-dry soil in very sandy soils or as high as 30 pounds of water for 100 pounds of certain clayey soils.

Igneous rock: Rock produced through the cooling of melted mineral matter. When the cooling process is slow, the rock contains fair-sized crystals of the individual minerals, as in granite.

Illuviation: An accumulation of material in a soil horizon through the deposition of dispersed mineral and organic matter originating from higher lying horizons. Since at least part of the fine clay in the B horizons (or "subsoils") of many soils has moved into them from the A horizons above, these are called illuvial horizons.

Immature soil: A soil with a weakly developed or indistinct profile lacking clear individual horizons because of its youth, or the relatively short time for soil-building forces to act upon the parent material since its deposition.

Immobilization (of plant nutrients): The conversion of an available plant nutrient in the soil from an inorganic to an organic form in living tissue. Thus the addition of fresh straw or sawdust to the soil may greatly increase the number of bacteria. These remove available nitrogen and phosphorus from the soil and immobilize them within their cells.

Impervious soil: A soil through which water or roots penetrate slowly if at all. No soil is absolutely impervious to water and air all of the time.

Infiltration: The downward movement of water into a soil.

Inherited soil characteristics: Any characteristic of a soil that is due directly to the nature of the parent material or geological formation as contrasted to the characteristics that are wholly or partly the result of soil-forming processes acting on parent material. For example, some soils are red in color owing exclusively to the fact that the parent material was red; although the red color of most red soils is due to soil-forming processes.

Intrazonal soil: Any one of the great groups of soils having more or less well developed soil characteristics that reflect a dominating influence of some local factor of relief or of parent material over the normal influences of the climate and the vegetation on the soil-forming processes. Such groups of soil may be geographically associated with two or more of the zonal groups of soils having characteristics dominated by the influence of climate and vegetation.

Ion: Broadly, an electrically charged particle. As used in soils, an ion refers to an electrically charged element or group of elements produced by the breaking up of an electrolyte in solution. Since most soil solutions are highly dilute, many of the salts exist as ions. For example, potassium chloride (muriate of potash) in the soil exists partly as potassium ions and chloride ions. The positively charged potassium ion is called a cation and the negatively charged chloride ion is called an anion.

Irrigation: The application of water through engineering works to soil in order to make it more productive for plants.

Lacustrine deposition: Materials deposited from lake water. Many nearly level soils have developed from such deposits of old lakes that have long since disappeared.

Land: The total natural and cultural environment within which production takes place. Land is a broader term than soil. In addition to soil, its attributes include other physical conditions such as mineral deposits and water supply; location in relation to centers of commerce, populations, and other land; the size of the individual tracts or holdings; and existing plant cover, works of improvement, and the like. (Some use the term loosely in other senses: (1) as defined above, but without the economic criteria, especially in the expression "natural lands;" (2) as a synonym for "soil" and (3) for the solid surface of the earth; and also, more strictly, for earthy surface formations, especially in the geomorphological expression "land form.")

Land-capability classification: A grouping of kinds of soil into special units, subclasses, and classes according to their capability for intensive use and the treatments required for sustained use.

Landscape: The sum total of the characteristics that distinguish a certain kind of area on the earth's surface and give it a distinguishing pattern in contrast to other kinds of areas. Any one kind of soil is said to have a characteristic natural landscape, and under different uses it has one or more characteristic cultural landscapes.

Land uses, major rural: (1) Crop production, including crops ordinarily harvested, except forests; (2) grazing; (3) forest, including the production of repeated crops of forest trees; (4) recreation, including tracts for observation or educational purposes; (5) wildlife preservation; (6) mineral extraction; and (7) protection - the use of land to prevent injury to water supplies or to other more valuable land.

Land use pattern: The aerial design or arrangement of land uses, both major and minor, including the boundaries of operating units.

Land use planning: The development of plans for the uses of land that will, over long periods, best serve the general welfare, together with the formulation of ways and means for achieving such uses.

Lateral: A branched ditch leading off from a main drainage ditch or irrigation canal.

Leaching: The removal of materials in solution by percolating water.

Length-of-run: The distance over which irrigation water is carried in furrows or by flooding from the head ditch.

Level terrace: A broad surface channel or embankment constructed across sloping soil on the contour as contrasted to a "graded terrace," which is built at a slight angle to the contour. A level terrace can be used only on soils that are permeable enough for all of the storm water to soak into the soil so that none breaks over the terrace to cause gullies.

Ley: A term used in English writing for pastures or meadows. A short ley is roughly equivalent to our "rotation" pasture or meadow, and a long ley to our "longtime" pastures and meadows, often called incorrectly "permanent."

Light soil: An old term formerly used for sandy or coarse-textured soils. (The term originated from the "light" draught on the horses when plowing.)

Lime: Generally the term lime, or agricultural lime, is applied to ground limestone (or calcium carbonate), hydrated lime (calcium hydroxide), or burned lime (calcium oxide), with or without mixtures of magnesium carbonate, magnesium hydroxide, or magnesium oxide, used as an amendment to reduce the acidity of acid soils. (In strict chemical terminology lime refers to calcium oxide (CaO) but by an extension of meaning it is now used for all materials applied to neutralize acid soils.)

Liming: The application of calcium or calcium-and-magnesium-bearing materials to soil in order to reduce soil acidity and to supply calcium or magnesium as plant nutrients.

Liming requirement: The amount of standard ground limestone required to bring an acre of a 6-2/3-inch layer (about 2 million pounds in mineral soils) of acid soil to some specific degree of acidity, usually to slightly or very slightly acid. (See Reaction, soil). In common practice lime requirements are given in tons per acre of nearly pure limestone, ground finely enough so that all of it passes a 10-mesh screen and at least half of it passes a 100-mesh screen.

Lister: A kind of double plow with shares that throw the soil in opposite directions and leave the field with alternate ridges and furrows.

Lithosol: A soil having little or no evidence of soil development and consisting mainly of a partly weathered mass of rock fragments or of nearly barren rock.

Loams: The textural class name for a soil having a roughly even mixture of sand, silt, and clay. Loam soils contain up to 27 percent clay, 28 to 50 percent sand, and less than 52 percent silt. (In the old literature, especially English literature, the term "loam" applied to mellow soils rich in organic matter regardless of the texture. As used in the United States the term refers only to the relative amounts of sand, silt, and clay, and loam soils may or may not be mellow.)

Loamy soil: A general expression for soils of intermediate texture between the coarse-textured or sandy soils, on the one hand, and the fine-textured or clayey soils on the other. Sandy loams, loams, silt loams, and clay loams are regarded as loamy soils.

Loess: Geological deposit of relatively uniform fine material, mostly silt, presumably transported by the wind. Many unlike kinds of soil in the United States have developed from loess blown out of old alluvial valleys and from other deposits during periods of great aridity.

Manure: Generally, the refuse from stables and barnyards including both animal excreta and straw or other litter. (In some other countries the term "manure" is used more broadly and includes both farmyard or animal manure and "chemical manure," for which the term "fertilizer" is nearly always used in the United States.)

Marl: An earthy deposit consisting mainly of calcium carbonate more or less mixed with clay or other impurities. It is formed chiefly at the margins of fresh-water lakes. It is commonly used as an amendment for liming acid soils.

Mature soil: Any soil with well developed characteristics produced by the natural processes of soil formation and in near-equilibrium with its present environment.

Mechanical analysis: The physical analysis of soil materials to determine the amounts of the various soil separates, or grain-size fractions.

Mediterranean climate: A general term for warm-temperature climates that are relatively dry in the warm season and relatively moist in the cool season.

Mellow: A porous softly granular soil easily worked without becoming compacted.

Metamorphic rock: A rock that has been greatly altered from its previous condition through the combined action of heat and pressure. For example, marble is a metamorphic rock produced from limestone, gneiss is one produced from granite, and slate is produced from shale.

Microclimate: The local climatic condition resulting from the modification of the general climatic condition by local differences in elevation and exposure.

Microrelief: Small-scale differences in relief, such as small mounds, swales, or pits that are a few feet across and have differences in elevation of a few inches to around 3 feet that are significant to the soil-forming processes, to the growth of plants, or to preparing the soil for cultivation.

Mineral soil: A general term for a soil composed chiefly of mineral matter, in contrast to an organic soil composed chiefly of organic matter.

Mineralization: The release of mineral matter from organic matter, especially through microbial decomposition.

Minor elements: A general term for those plant nutrients required by plants in only small amounts, as contrasted to the primary plant nutrients required in large amounts. Recent usage favors the term trace elements.

Mole drainage: The drainage of soil by making underground tubular channels with the use of a special implement, called a mole plow, that pulls a ball or cylinder through the soil at a depth of 2 to 3 feet.

Montmorillonite: A layered clay mineral that expands and contracts with the absorption and loss of water.

Morphology, soil: The physical constitution of the soil including the texture, structure, consistence, color, and other physical and chemical properties of the various soil horizons that make up the soil profile.

Mottled (soil): Soil horizons irregularly marked with spots of color. A common cause of mottling in soils is imperfect or impeded drainage, although there are other causes, such as soil development from an unevenly weathered rock.

Muck: Highly decomposed organic soil material developed from peat. Generally speaking, muck has a higher mineral or ash content than peat and is decomposed to the point that the original plant parts cannot be identified.

Mulch: A natural or artificially applied layer of plant residues or other materials on the surface of the soil. Mulches are generally used to help conserve moisture, to control temperature, to prevent surface compaction or crusting, to reduce runoff and erosion, to improve soil structure, or to control weeds. Mulching materials normally include compost, sawdust, wood chips, and straw, but sometimes paper, fine brush, or small stones are used.

Mulch tillage: Tillage of the soil and treatment of crop residues in ways to leave plant materials within or on the soil surface to form a mulch.

Mull: A humus-rich layer of forested soils consisting of mixed organic and mineral matter with a gradational boundary to the underlying mineral soil.

Mycorrhiza: Fine filaments of fungi that grow on plant roots from which they receive part of their nutrients.

Neutral soil: A soil that is neither significantly acid nor alkaline. Strictly, a neutral soil has pH of 7.0; in practice, a neutral soil has a pH between 6.6 and 7.3.

Nitrification: The formation of nitrates from ammonia, as in soils by micro-organisms.

Nitrogen fixation: Generally, the conversion of atmospheric or "free" nitrogen to nitrogen combined with other elements. Specifically in soils, the assimilation of free nitrogen from the air by soil organisms and the formation of nitrogen compounds that eventually become available to plants. The nitrogen-fixing organisms associated with legumes are called symbiotic; and those not definitely associated with the higher plants are called non-symbiotic.

Noncapillary porosity: That part of the total volume of a soil made up of large pores that do not hold capillary or film water against the force of gravity.

Normal soil: A soil having a profile in near-equilibrium with its environment; developed under good but not excessive drainage from parent material of mixed mineralogical, physical, and chemical composition; and expressing in its characteristics the full effects of the forces of climate and living matter.

Nutrient, plant: Any element taken in by a plant, essential to its growth, and used by it in elaboration of its food and tissue. The elements known to be essential include carbon, hydrogen, and oxygen, mainly from the air and water; and nitrogen, phosphorus, calcium, potassium, magnesium, sulphur, iron, manganese, copper, boron, zinc, molybdenum, vanadium, and perhaps sodium and chlorine mainly from the soil. Plants also take in other elements, including some having no known functions in plants but which are essential to animals, such as iodine and cobalt.

Order (soil classification): The highest category in soil classification. The three orders are zonal soils, intrazonal soils, and azonal soils.

Organic soil: A general term applied to a soil or to a soil horizon that consists primarily of organic matter, such as peat soils, muck soils, and peaty soil layers.

Oxidation: A chemical change involving the addition of oxygen or its chemical equivalent to an element or compound, more technically, a chemical change that involves an increase of positive valence or a decrease of negative valence. For example if iron is changed from the ferrous state in which it has 2 positive valences to the ferric state in which it has 3 positive valences, the iron is said to be oxidized. The reverse procedure is reduction.

Oxide: A compound of any element with oxygen alone.

Pan: A layer or a horizon in a soil that is firmly compacted, indurated, or very rich in clay. Examples include hardpans, fragipans, and claypans.

Parent material: The unconsolidated mass of rock material (or peat) from which the soil profile develops.

Parent rock: The rock from which parent materials of soils are formed.

Partial sterilization: The elimination of part of the micro-organisms in a soil by treatment with heat or chemicals.

Parts per million (ppm): A convenient notation for indicating small amounts of materials. The numbers give the number of units by weight of the substance per million weight units of oven-dry soil. Thus parts per million expresses the number of pounds of the substance per million pounds of soil; or the term may be used to express the number of weight units of a substance per million weight units of solution.

Peat: Unconsolidated soil material consisting largely of undecomposed or only slightly decomposed organic matter accumulated under conditions of excessive moisture.

Ped: An individual natural soil aggregate such as a crumb, a prism, or a block, in contrast to a clod, which is a mass of soil brought about by digging or other disturbance.

Pedology: The science that treats of soil; soil science. Pedology is from the Greek word for ground or earth. In the United States custom has commonly limited this term to the phases of soil science that relate directly to soil morphology, genesis, and classification. In many other countries of the world, however, pedology is the science that treats of soils, including their nature, properties, formation, functioning, behavior, and response to use and management, and thus a direct synonym for "soil science" as used in the United States.

Percolation: The downward movement of water through soil.

Permanent pasture: Pasture that occupies the soil for a long time in contrast to rotation pasture, which occupies the soil for only a year or two in a rotation cycle with other crops. This is an unfortunate term since very few pastures can be kept in efficient condition in humid forested areas without occasional tillage, at least light tillage for reseeding. As used in the United States the term "permanent pasture" is equivalent to the more appropriate European term, "long ley."

Permeability, soil: That quality of a soil horizon that enables it to transmit water or air. It can be measured quantitatively in terms of rate of flow of water through a unit cross section in saturated soil in unit time under specified temperature and hydraulic conditions. The permeability of a soil may be limited by the presence of only one nearly impermeable horizon even though the others are permeable.

pH: A common numerical designation of weak acidity and alkalinity in soils and other biological systems. Technically, pH is the common logarithm of the reciprocal of the hydrogen-ion concentration of a solution. A pH of 7.0 indicates precise neutrality, higher values indicate alkalinity, and lower values indicate acidity. (See Reaction, soil).

Phase, soil: That part of a soil type or other classificational soil unit having variations in characteristics not significant to the classification of the soil in its natural landscape but significant to the use and management of the soil. Examples of the variations recognized by phases of soil types include differences in slope, stoniness, thickness because of erosion.

Pitting: The making of shallow pits in the soil to retain rainwater or snow melt. This is mainly carried out in soils of short-grass rangelands with an offset disk or pitting machine.

Piping, soil: A form of accelerated soil erosion that results in subterranean channels that may later grow into huge cavities and gullies.

Planosol: An intrazonal group of soils with eluviated surface horizons underlain by claypans, developed on nearly flat or gently sloping uplands in humid or subhumid climates.

Plant food (See Food, plant).

Plant nutrients: (See Nutrients, plant).

Plastic: Capable of being molded without rupture.

Platy: Soil aggregates with thin vertical axes and long horizontal axes.

Podzol: A zonal group of soils having organic mats and a very thin organic-mineral horizons above gray leached horizons that rest upon illuvial dark-brown horizons, developed under coniferous or mixed forests or under heath vegetation, in a cool-temperate moist climate. The term comes from an old Russian word for like, or near, ash originally applied to the gray leached horizon.

Podzolic soil: Soils that have part or all of the characteristics of the Podzol soils, especially leached surface soils that are somewhat lower in clay than the B horizons beneath.

Podzolization: A general term for the combinations of processes by which soils are depleted of bases, become acid, and come to have eluvial A horizons (surface layers of removal) and illuvial B horizons (lower horizons of accumulation).

Pore space: The total space within soils not occupied by solid particles.

Porosity, soil: The degree to which the soil mass is permeated with pores or cavities. It is expressed as the percentage of the whole volume of the soil horizon that is unoccupied by solid particles. That part of the porosity consisting of small pores that hold water by capillary it is called capillary porosity, and that part occupied by larger pores that do not hold water by capillarity under free drainage is called noncapillary porosity.

Prairie soils: A zonal group of soils having dark-colored surface horizons grading through brown soil material to lighter colored parent material at 2 to 5 feet, formed under tall grasses in a temperate, relatively humid climate. The term has a restricted meaning in soil science and does not apply to all soils developed in treeless landscapes.

Precipitation-effectiveness (P-E) index: The sum of the 12 monthly quotients of precipitation divided by evaporation.

Prismatic soil structure: Prismlike structural aggregates with the vertical axes of the aggregates longer than the horizontal axes.

Productivity (of soil): The capability of a soil for producing a specified plant or sequence of plants under a defined set of management practices. It is measured in terms of the outputs or harvests in relation to the inputs of production factors for a specific kind of soil under a physically defined system of management.

Profile (soil): A vertical section of the soil through all its horizons and extending into the parent material. (See Horizon, soil).

Puddled soil: Dense massive soil having no regular structure. The condition commonly results from the tillage of a clayey soil when it is wet.

Range site: Kind of rangeland defined by kinds of soil and climate, that has a specific climax vegetation.

Rangeland: Land that produces primarily native forage plants suitable for grazing by livestock, including that also growing some forest trees. Much useful rangeland is not suitable for cultivation.

Reaction, soil: The degree of acidity or alkalinity of a soil mass expressed in either pH value or in words as follows:

	pH		pH
Extremely acid.....	Below 4.5	Neutral ^{1/}	6.6-7.3
Very strongly acid.....	4.5-5.0	Mildly alkaline..	7.4-7.8
Strongly acid.....	5.1-5.5	Moderately "	7.9-8.4
Medium acid.....	5.6-6.0	Strongly "	8.5-9.0
Slightly acid.....	6.1-6.5	Very strongly "	9.1 and higher

^{1/} Strict neutrality is pH 7.0, but in field work those soils between pH 6.6 and 7.3 are called neutral. In the rare cases where significant, the terms very slightly acid and very mildly alkaline may be used for soils of pH 6.6 to 6.9 and 7.1 to 7.3, respectively.

Red Podzolic soils: Formerly used for a zonal group of soils having thin organic and organic-mineral layers over a yellowish-brown leached horizon that rests upon an illuvial red horizon, developed under deciduous, or mixed deciduous and coniferous forests in a warm to warm-temperate humid climate. These are now placed in the Red-Yellow Podzolic group.

Reduction: Any chemical change involving the removal of oxygen or its chemical equivalent. More technically, a chemical change involving a decrease of positive valence or an increase of negative valence. This is the reverse of oxidation.

Regolith: The unconsolidated mantel of weathered rock and soil material on the earth's surface; or the loose earth materials above solid rock. Only the upper part of this, modified by organisms and other soil-building forces, is regarded by soil scientists as "soil." In soil mechanics, however, most American engineers speak of the whole regolith, even to great depths, as "soil."

Regosol: An azonal group of soils that includes those without definite genetic horizons developing from deep unconsolidated or soft rocky deposits.

Relief: Elevations or inequalities of the land surface, considered collectively.

Rendzina: An intrazonal group of soils, usually with brown or black friable surface horizons underlain by light-gray or pale-yellow soft calcareous material, developed under grass vegetation or mixed grass and forest vegetation, in humid and semiarid regions.

Residual material: Unconsolidated and partly weathered parent material for soils presumed to be developed from the same kind of rock as that on which it lies. The term "residual" is sometimes incorrectly applied to soils but it can be applied correctly only to the material from which soil-forming processes have produced a soil.

Reversion: The interaction of a soluble form of a plant nutrient within soil which causes it to change into a less soluble form.

Rhizobia: The bacteria that can live in symbiotic relations with leguminous plants within nodules on their roots. The normal result of the association is the fixation of nitrogen from the air into forms that can be used by living plants.

Rhizosphere: The soil life in the immediate vicinity of the plant roots in which the abundance and composition of the microbial population is influenced by the presence of roots.

Ridge terrace: A long low ridge of earth with gently sloping sides and a shallow channel along the upper side to retain or to divert water across the soil slope. Ridge terraces may be level (on the contour) if the soil is sufficiently permeable to take in all the water that accumulates from storms. Where the soils are not sufficiently permeable to take in all the water, ridge terraces must be laid out as graded terraces at a slight angle to the contour so that the excess water may flow off to a prepared outlet in an orderly manner.

Rill erosion: (See Erosion, rill).

Riprap: Broken stone and other resistant materials used on exposed surfaces of earth such as those on the faces of dams or on the banks of streams, lakes, or the sea to protect them against the action of running water or waves.

Rotation grazing: The grazing of two or more pastures, or parts of a range, in regular order with appropriate recovery periods between grazing.

Rotation pasture: An area used intermittently for pasture and for cultivated crops. Usually the pasture occupies the soil for 2 to 3 years before being plowed up for crops.

Rotations: (See Crop rotations).

Saline soil: A soil containing enough soluble salts to impair its productivity for plants but not excessively alkaline.

Saline-alkali soil: A soil having a combination of a harmful quantity of salts and either a high degree of alkalinity or a high amount of exchangeable sodium, or both, so distributed in the soil profile that the growth of most crop plants is less than normal.

Sand: (1) Individual rock or mineral fragments in soils having diameters ranging from 0.5 mm to 2.0 mm. Although usually sand grains consist chiefly of quartz, they may be of any mineral composition. (2) The textural class name of any soil that contains 85 percent or more of sand and not more than 10 percent clay.

Sandy clay: Soil of this textural class contains 35 percent or more of clay and 45 percent or more of sand.

Sandy clay loam: Generally, soil of this textural class contains 20 to 35 percent clay, less than 28 percent sand, and 45 percent or more of sand.

Sandy loam: Generally, soil of the sandy loam class of texture has 50 percent sand and less than 20 percent clay.

Sandy soils: A broad term for soils of the sand and loamy sand classes; soil material with more than 70 percent sand and less than 15 percent clay.

Scabland: A local term for soil or land characterized by numerous small outcrops of lava rock.

Sedimentary rock: A rock composed of particles deposited from suspension in water. Chief groups of sedimentary rocks are: (1) Conglomerates, from gravels; (2) sandstones, from sand; (3) shales, from clay; and (4) limestones, from deposited calcium carbonate. There are many intermediate types between these. (Some wind-deposited sands have been consolidated into sandstones.)

Seepage: The escape of water through the soil; or water emerging from the soil along an extensive line of surface, in contrast to springs where the water emerges from a local spot.

Semiarid climate: A climate characteristic of the regions intermediate between the true deserts on the one hand and subhumid areas on the other. In the semiarid climate the precipitation-effectiveness (P-E) index ranges between 16 and 32. The upper limit of the average annual precipitation in cool semiarid regions is as low as 15 inches and in warm regions as much as 45 inches. The vegetation is close-growing or scattered short grass, bunchgrass, or shrubs. Soils in such regions that can take in nearly all of the rain that falls and that can hold it for crop plants can be used for crops under dry-farming methods but irrigation is common where water is available.

Separate, soil: One of the individual-size groups of mineral soil particles - sand, silt, or clay.

Series, soil: A group of soils having soil horizons similar in their differentiating characteristics and arrangement in the soil profile, except for the texture of the surface soil, and that are formed from a particular type of parent material. (Soil series is an important category in detailed soil classification. Individual ones are given proper names from place names near the first recorded occurrence. Thus names like Houston, Cecil, Barnes, and Miami are names of soil series that appear on soil maps and each connotes a unique combination of many soil characteristics.)

Sheet, erosion: (See Erosion, sheet).

Shelterbelt: An extended windbreak of living trees and shrubs for the protection of farmlands.

Sierozem soils: A zonal group of soils having brownish-gray surface horizons that grade through lighter colored material into accumulated calcium carbonate, developed under mixed shrub vegetation in a temperate to cool arid climate. The term comes from the Russian word for gray earth.

Silica-sesquioxide ratio: The ratio of the number of molecules of silica to the number of molecules of alumina and of iron oxide in a soil or in the clay fraction of a soil. Speaking very generally, the more highly weathered materials of warm-temperate humid regions, and especially of the Tropics, have low ratios, and the clay in soils with low ratios are less active, both physically and chemically, than those with high ratios.

Silt: (1) Individual mineral particles of soil that range in diameter between the upper size of clay, 0.002 mm., to the lower size of very fine sand, 0.05 mm. (2) Soil of the textural class silt contains 80 percent or more of silt and less than 12 percent clay. (3) Sediments deposited from water in which the individual grains are approximately of the size of silt, although the term is sometimes applied loosely to sediments containing considerable sand and clay.

Single grain soil: A structureless soil in which each particle exists separately, as in dune sand.

Site index (forest): A numerical expression used in stating the relative productivity of a soil for forest trees. It is determined by the rate of growth in height of one or more tree species under defined conditions.

Skeletal soil: Equivalent to Lithosol.

Slick spot: A small area of alkali soil.

Slip: The downslope movement of a mass of soil under wet or saturated conditions; a micro-landslide which produces a characteristic micro-relief in soils.

Slope, soil: The incline of the surface of a soil area. It is usually expressed in percent slope, which equals the vertical distance divided by the horizontal distance times 100.

Soil: (1) The natural medium for the growth of land plants. (2) A dynamic natural body on the surface of the earth in which plants grow, composed of mineral and organic materials and living forms. (3) More technically, soil is the collection of natural bodies occupying parts of the earth's surface that support plants and that have properties due to the integrated effect of climate and living matter, acting upon parent material, as conditioned by relief, over periods of time.

A soil is an individual 3-dimensional body on the surface of the earth with area and depth and unlike the adjoining bodies. (The area of individual soils ranges from less than 1/2 acre to more than 300 acres.) A kind of soil is the collection of the soil areas that are unlike in specified combinations of characteristics. Kinds of soil are given names in the system of soil classification. The soil is a collective term used for all soils, equivalent to the word "vegetation" for all plants.

Soil association: A group of defined and named kinds of soil, regularly associated together in a characteristic geographic pattern. Except on detailed soil maps, it is not possible to delineate the various kinds of soil individually, so that on all small-scale soil maps the areas shown consist of two or more kinds of soil in areas that are geographically associated.

Soil blowing: Removal of fine dry soil material by moving air; equals "wind erosion" as commonly used.

Soil climate: The moisture and temperature conditions existing within the soil.

Soil conservation: The efficient use and stability of each area of soil that is needed for use at its optimum level of developed productivity according to the specific patterns of soil and water resources of individual farms, ranches, forests, and other land-management units. The term includes the positive concept of improvement of soils for use as well as their protection and preservation.

Soil erosion (See Erosion, soil)

Soil management: The preparation, manipulation, and treatment of soils for the production of plants, including crops, grasses, trees, and other plants.

Soil survey: A general term for the systematic examination of soils in the field and in the laboratories, their description and classification, the mapping of kinds of soil, and the interpretation of soils according to their adaptability for various crops, grasses, and trees, their behavior, under use or treatment for plant production or for other purposes, and their productivity under different manavement systems.

Solonchak soils: An intrazonal group of soils with high concentrations of soluble salts in relation to other soils, usually light colored, without characteristic structural form, developed under salt-loving plants, and occurring mostly in a subhumid or semiarid climate. In soil classification the term applies to a broad group of soils and is only approximately equivalent to the common term "saline soil." (From a Russian term for salty soils.)

Solonetz soil: An intrazonal group of soils having surface horizons of varying degrees of friability underlain by dark-colored hard soil, ordinarily with columnar structure (prismatic structure with rounded tops). This hard layer is usually highly alkaline. Such soils are developed under grass or shrub vegetation, mostly in subhumid or semiarid climates. This term is used for a broad group of soils that include many called alkali soils in the western part of the United States.

Solum (Plural: sola). The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. In mature soils the solum includes the A and B horizons. Usually the characteristics of the material in these horizons is quite unlike those of the underlying parent material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Spillway: A conduit in or around a dam for the escape of excess water.

Spoilbank: A pile of soil or earthy material excavated from a drainage ditch or other cut.

Sprigging: The planting of stolons, rhizomes, or other vegetative parts of plants.

Stratified: Composed of, or arranged in, strata or layers, such as stratified alluvium. The term is confined to geological materials. Layers in soils that result from the processes of soil formation are called horizons, whereas those inherited from the parent material are called strata.

Stripcropping: The practice of growing crops in a systematic arrangement of strips or bands. Commonly cultivated crops and sod crops are alternated in strips to protect the soil and vegetation against running water or wind. The alternate strips are laid out approximately on the contour on erosive soils or at approximate right angles to the prevailing direction of the wind where soil blowing is a hazard.

Structure, soil: The aggregation of primary soil particles into combined particles or clusters of primary particles that are separated from adjoining aggregates. The principal forms of soil structure are platy, prismatic, columnar (prisms with rounded tops), blocky (angular or sub-angular), and granular. Structureless soils are (1) single grain - each grain by itself, as in dune sand; or (2) massive - the particles adhering together without any regular cleavage as in many claypans and hardpans. ("Good" or "bad tilth" are terms for the general structural condition of cultivated soils according to particular plants or sequences of plants.)

Stubble mulch: A mulch consisting of the stubble and other crop residues left in and on the surface of the soil as a protective cover during the preparation of a seedbed and during part of the growing of the succeeding crop.

Subhumid climate: A climate intermediate between semiarid and humid with sufficient precipitation to support a moderate to heavy growth of short and tall grasses, or shrubs, or of these and widely spaced trees or clumps of trees. The precipitation-effectiveness (P-E) index ranges from about 32 to 64. The upper limit of rainfall in subhumid climates may be as low as 20 inches in cold regions and as high as 60 inches in hot regions. In subhumid areas, where the rainfall comes mostly during the growing season, there may be a considerable stand of trees along with the grass.

Subirrigation: Irrigation through controlling the water table in order to raise it into the root zone; water is applied in open ditches or through tile until the water table is raised enough to wet the soil. Some soils along streams are said to be naturally "subirrigated."

Subsoil: The B horizons of soils with distinct profiles. In soils with weak profile development the subsoil can be defined as the soil below the plowed soil, or its equivalent of surface soil, in which roots normally grow. Although a common term, it cannot be defined accurately. It has been carried over from early days when "soil" was conceived only as the plowed soil and that under it as the "subsoil."

Subsoiling: The tillage of the soil below the normal plow depth, usually to shatter a hardpan or claypan.

Substratum: Any layer lying beneath the solum or true soil. It is applied to both parent materials and to other layers unlike the parent material, below the B horizon or the "subsoil."

Subsurface tillage: Tillage with a sweeplike plow or blade that does not turn over the surface cover or incorporate it into the lower soil.

Summer fallow (See Fallow):

Supplemental irrigation: Irrigation during dry periods in regions where the normal precipitation supplies most of the moisture for crops.

Surface soil: The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness.

Symbiosis: The living together of two unlike organisms with a resulting mutual benefit. A common example includes the association of rhizobia with legumes. The nitrogen fixation is therefore sometimes called "symbiotic nitrogen fixation."

Terrace (for control of runoff or soil erosion or both): An embankment or ridge constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff in order to retard it for infiltration into the soil and so that any excess may flow slowly to a prepared outlet without harm.

Terrace (geological): A nearly flat or undulating plain, commonly rather narrow and usually with a steep front, bordering a river, a lake, or the sea. Although many old terraces have become more or less hilly through dissection by streams, they are still regarded as terraces.

Textural class, soil: Kinds of soil material according to the proportions of sand, silt, and clay. The principal textural classes in soil, in increasing order of the content of silt and clay, especially clay, are as follows: Sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, sandy clay loam, sandy clay, and clay. These class names are modified to indicate the size of the sand fraction or the presence of gravel, cobbles, and stones. For example, terms such as loamy fine sand, very fine sandy loam, gravelly loam, stony clay, and cobbly loam, are used on detailed soil maps. These terms apply only to individual soil horizons or to the surface layer of a soil type, as in the name "Miami silt loam." Commonly the various horizons of any one kind of soil belong in different soil textural classes.

Texture, soil: The relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of sand, silt, and clay.

Tile drain: Pipe made of concrete or pottery placed at suitable spacings and depths in the soil to collect and to carry away excess water.

Tilth, soil: The physical condition of a soil in respect to its fitness for the growth of a specified plant or sequence of plants. Ideal soil tilth is not the same for each kind of crop nor is it uniform for the same kind of crop growing on contrasting kinds of soil.

Topsoil: A general term used in at least four different senses:

(1) A presumed fertile soil or soil material, usually rich in organic matter, used to top-dress roadbanks, lawns, and gardens. (2) The surface plow layer of a soil and thus a synonym for surface soil; (3) the original or present dark-colored upper soil, which ranges from a mere fraction of an inch to 2 or 3 feet on different kinds of soil; and (4) the original or present A horizon, varying widely among different kinds of soil. Applied to soils in the field, the term has no precise meaning unless defined as to depth or productivity in relation to a specific kind of soil.

Trace elements: Elements found in plants in only small amounts, including several that are essential to plant growth, others that are essential to animals, even though not to plants, and others having no known biological functions.

Truncated soil: A soil that has had the upper part of the solum removed by accelerated erosion or in other ways.

Type, soil: (1) A soil type is a subgrouping under the soil series based on the texture of the surface soil. (2) Soil type is a group of soils having horizons similar in differentiating characteristics and arrangement in the soil profile, and developed from a particular type of parent material. The name of a soil type consists of the name of the soil series plus the textural class name of the upper part of the soil equivalent to the surface soil. Thus Miami silt loam is the name of a soil type within the Miami series.

Volume weight: The term formerly used for what is now called bulk density.

Wash: Sometimes used as a synonym for accelerated sheet erosion; for a gully; or for the dry bed of an intermittent stream.

Waste land: Land essentially incapable of producing material of value or of being used for other economic purposes.

Water requirement (of plants): Generally, the amount of water required by plants for satisfactory growth during the season. More strictly, the number of units of water required by a plant during the growing season in relation to the number of units of dry matter produced. The water requirement varies with climatic conditions, soil moisture, and soil characteristics. Factors unfavorable to plant growth, such as low fertility, disease, and drought, increase the water requirement.

Water spreading: The diverting of floodwater from a water course or gully and spreading it over relative flat areas, to control erosion, to increase plant growth, or to replenish supplies of ground water. This is usually done by constructing diversions or dikes.

Water table: The upper limit of the part of the soil or underlying rock material that is wholly saturated with water. In some places an upper or "perched" water table may be separated from a lower one by a dry zone.

Waterlogged: A condition of soil in which both large and small pore spaces are filled with water. The soil may be intermittently waterlogged because of a fluctuating water table or waterlogged for short periods after rain.

Watershed: In the United States the term refers to the total area above a given point on a stream that contributes water to the flow at that point. Synonyms are "drainage basin" or "catchment basin." Elsewhere in the world the term is used for the topographic boundary separating one drainage basin from another.

Weathering: The physical and chemical disintegration and decomposition of rocks and minerals.

Wet climate: A climate in which the precipitation-effectiveness (P-E) index is about 128 and a rain-forest vegetation prevails.

Wet-dry climate: A climate having alternating wet and dry seasons, such as a wet summer and a dry winter, or the reverse.

Wild flooding: The release of irrigation water at high points in a field without controlled distribution.

Wilting coefficient: The percentage of moisture remaining in a soil, on an oven-dry basis, when plants reach a condition of permanent wilting and will not recover when placed in a saturated atmosphere.

Wind Erosion (See Erosion)

Windbreak: A planting of trees and shrubs, usually with three or more rows, to reduce or to check the force of wind in order to protect fields and homesteads. Windbreaks are established to protect crops, to reduce soil blowing, to conserve moisture, and to control snow drifting. (Sometimes these are called wind barriers.)

Yellow Podzolic soils: Formerly used for a zonal group of soils having thin organic and organic-mineral layers over grayish-yellow leached horizons that rest on yellow B horizons, developed under coniferous or mixed coniferous and deciduous forests in a warm-temperate to warm, moist climate. These soils are now combined into the Red-Yellow Podzolic group.

Zonal soil: Any of the great groups of soils having well-developed soil characteristics that reflect the influence of the active factors of soil formation, especially climate and vegetation.

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